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(54) PROTECTIVE COATING AGENT FOR HIGH DENSITY OPTICAL DISC AND HARDENED MATTER THEREOF

(57)Abstract:

PURPOSE: To obtain a protective coating agent, and a hardened matter thereof, for optical disc excellent in mechanical strength and having a radiation curing resin layer where warping under high temperature high humidity environment is suppressed by employing a resin composition having tensile fracture elongation of predetermined value or above.

CONSTITUTION: The protective coating agent for optical disc is produced by coating the memory part of an optical disc with a radiation curing resin composition having tensile fracture elongation, regulated by JISK7127, of 15% or above at 25°C. The composition of the protective coating agent for optical disc contains more than one (meta) acrylate, i.e., monofunctional monomer or oligomer, in a molecule. The protective coating agent for optical disc is applied covering the recording part on a transparent substrate in order to isolate the recording part from oxygen and moisture in the air thus protecting the recording part from corrosion or the like. Furthermore, the coating agent prevent the optical disc from warping and ensures high quality recording/reproduction for a long term under high temperature high humidity environment.

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CLAIMS

[Claim(s)]

[Claim 1] The protection-code agent for radiation hardening mold high density optical disks whose tensile fracture elongation of a hardened material is 15% or more [claim 2] The hardened material of the protection coat agent for optical disks according to claim 1

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] Especially this invention relates to the protection coat agent for optical disks hardened by the exposure of the radiation which was excellent in the mechanical property with little curvature under the high-humidity/temperature environment about the protection coat agent for optical disks.

[0002]

[Description of the Prior Art] Conventionally, as an optical disk which performs informational record and playback by the exposure of a laser beam, various media, such as a magneto-optic disk, various write once optical disks, a compact disk, and a laser disc, are put in practical use.

[0003] Generating of a crack is prevented in the inorganic layer by which a laminating is carried out to this optical disk on a substrate, the oxygen to a recording layer and permeation prevention of moisture are made perfect more, and what used the hardened material of an acrylate system resin constituent for the organic protective coat on the dielectric layer in order to maintain the property of record and playback over a long period of time under the environment of high-humidity/temperature is indicated by JP,61-123593,A, JP,61-133067,A, JP,61-139961,A, JP,61-153844,A, JP,2-107630,A, JP,2-132664,A, etc.

[0004] Moreover, since equipment will misread recording information or it will become decipherment impossible if curvature occurs in an optical disk substrate, it has been called for that it is low contraction as a protection coat agent. The protection coat agent by containing the oligomer of the amount of macromolecules in JP,56-135526,A, JP,2-123172,A, etc., in order to make hardening contraction low generally is proposed.

[0005] The densification for on the other hand introducing a lot of information and image data as the next generation into an optical disk is studied. In connection with this densification, the curvature of a disk poses a problem again. It is difficult to carry out high density optical disk application by the present disk, since curvature is large. Examination of the curvature by amelioration of current, a disk substrate, a protection coat agent, etc. is performed. It is in the situation that what are satisfied with the bottom of a high-humidity/temperature environment of is not offered, in the protection coat agent considered to be especially one of the factors of curvature.

[0006]

[The technical problem which invention makes solution *****] Even if it prepares the protective layer which consists of a hardened material of the radiation-curing mold resin constituent of low contraction of the above-mentioned conventional example, although it is good, in ordinary temperature, curvature is generated under a severe high-humidity/temperature environment like 80 degrees C and 90%RH.

[0007]

[Means for Solving the Problem] this invention persons reach this invention, as a result of inquiring wholeheartedly that the aforementioned technical problem should be solved. That is, when generating of a proper thing, then curvature was controlled in the tensile fracture elongation of the hardened material

of the radiation-curing mold resin constituent which applies generating of the curvature under a high-humidity/temperature environment, knowledge was acquired, and it resulted in invention.

[0008] This invention is JIS [in / it is proposed based on such invention and / to the Records Department top of an optical disk / 25 degrees C]. K The protection coat agent for optical disks characterized by being formed by applying and stiffening the radiation-curing mold resin constituent whose tensile fracture elongation specified by 7127 is 15% or more is offered.

[0009] The protection coat agent of this invention is formed so that it may cover on the Records Department which consists of functional film of a recording layer and a reflecting layer on a transparence substrate, it isolates the Records Department from the oxygen in air, and moisture, and prevents the corrosion of the Records Department etc.

[0010] As the above-mentioned transparence substrate, common substrate ingredients for optical disks, such as polycarbonate system resin, polymethylmethacrylate system resin, and amorphous polyolefine system resin, are mentioned. The recording layer and reflecting layer which are formed on the above-mentioned transparence substrate can be chosen as arbitration according to an application. For example, the thing by which the metallic reflection film was formed on imprinted patterns, such as CD and CD-ROM. That by which the rare earth 1 transition-metals alloy amorphous film etc. was formed on the perpendicular magnetic anisotropy films of a magneto-optic disk. In addition, a low-melt point point metal thin film, the phase change film, the film containing organic coloring matter, etc. are applicable also to the optical disk used as a recording layer.

[0011] Next, the component which the protection coat agent for optical disks of this invention (only henceforth a "constituent") constitutes is explained. Although the constituent of this invention contains two or more acrylate (meta) in a molecule as a monofunctional monomer and oligomer, depending on the class of radiation used in order to stiffen this, a photopolymerization initiator can be contained further.

[0012] As a monofunctional monomer used by this invention, tricyclodecane (meta) acrylate, dicyclopentadiene oxy-ethyl (meta) acrylate, dicyclopentanil(metha)acrylate, isoboronyl (meta) acrylate, adamantyl (meta) acrylate, phenyloxy ethyl (meta) acrylate, benzyl (meta) acrylate, tetrahydrofurfuryl (meta) acrylate, mono-HORIN acrylate, phenyl glycidyl (meta) acrylate, 2-hydroxy (meta) acrylate, etc. are mentioned, for example.

[0013] moreover, as a monomer which has two or more acryloyl (meta) radicals in a molecule For example, neopentyl GURIKORUJI (meta) acrylate, tricyclodecane JIMECHIRORUJI (meta) acrylate, Hydroxy pivalate di(meth)acrylate, polyethylene GURIKORUJI (meta) acrylate, JISHIKUROPENTANIRUJI (meta) acrylate, 1, 6-hexane JIORUJI (meta) acrylate, Tripropylene GURIKORUJI (meta) acrylate, neopentyl glycol denaturation TORIMECHI roll pro pansy (meta) acrylate, TORIMECHI roll pro pantry (meta) acrylate, pen TAERISURITORUTORI (meta) acrylate, Alkyl denaturation dipentaerythritol PENTA (meta) acrylate, Acrylic denaturation dipentaerythritol tetrapod (meta) acrylate, Dipentaerythritol hexa (meta) acrylate, KAPURO Ryton denaturation dipentaerythritol hexa (meta) acrylate, Pentaerythritol tetrapod (meta) acrylate, tris [(meta) acryloxyethyl] isocyanurate, caprolactone denaturation tris [(meta) acryloxyethyl] isocyanurate, ditrimethylol propane tetrapod (meta) acrylate, etc. are mentioned.

[0014] Even if one sort and at least two sorts or more of these monomers carry out mixed use at a rate of arbitration, they are not cared about. As amount of [in / used / a constituent], 5 - 90 weight section is desirable.

[0015] As oligomer which has two or more acryloyl (meta) radicals in a molecule for example, a bisphenol mold epoxy resin (for example, Epicoat 828 and 1001 by the oil-ized shell epoxy company and the bisphenol A mold epoxy resin of 1004 grades --) and the bisphenol female mold epoxy resin of Epicoat 4001P and 4002P and 4003P grade -- or Epoxy (meta) acrylate obtained by the reaction of epoxy resins, such as a novolak mold epoxy resin (for example, Epicoat 152 and 154 by the oil-ized shell epoxy company), and an acrylic acid (meta). moreover, polyhydric alcohol (for example, a NERUPENCHIRU glycol and ethylene glycol --) Propylene glycol, 1,6-hexanediol, trimethylol propane, Pentaerythritol, tricyclodecanedimethylol, a screw-[hydroxymethyl]-cyclohexane, etc. and

polybasic acid for example, a succinic acid, a phthalic acid, hexahydro phthalic anhydride, and a terephthalic acid -- Polyester (meta) acrylate obtained by the reaction of the polyester polyol and the acrylic acid (meta) which are obtained by the reaction with an adipic acid, an azelaic acid, tetrahydro phthalic anhydride, etc. Furthermore, polyether polyols, such as a polypropylene glycol and a polytetramethylene glycol, The polyester polyol obtained by the reaction of said polyhydric alcohol and said polybasic acid, The caprolactone polyol obtained by the reaction of said polyhydric alcohol and said polybasic acid, and epsilon-caprolactone, And polycarbonate polyols (for example, polycarbonate polyol obtained by the reaction of 1,6-hexanediol and diphenyl carbonate) and organic poly isocyanate for example, isophorone diisocyanate and hexa MECHIRENI diisocyanate -- Tolyene diisocyanate, xylenediisocyanate, diphenylmethane-4,4'-diisocyanate, Macromolecule partial saturation radical content resin, such as urethane (meta) acrylate obtained by the reaction of dicyclopentanyl diisocyanate etc. and a hydroxy (meta) acrylate compound, etc. is mentioned.

[0016] Also in these, bisphenol mold epoxy acrylate is desirable especially from the field of viscosity and hardenability. Moreover, even if one sort and at least two sorts or more of these oligomer carries out mixed use at a rate of arbitration, it is not cared about but its 5 - 70 weight section is desirable as amount of [in / used / a constituent].

[0017] When carrying out coating by the spin coater as viscosity of the constituent of this invention, 5-300cps and 25 degrees C are 5-100cps and 25 degrees C desirable especially preferably.

[0018] At ordinary temperature -80 degree C, the mixed dissolution of the constituent of this invention can be carried out, and it can obtain each component. It can obtain for the hardened material of the constituent of this invention to irradiate radiations, such as ultraviolet rays or an electron ray, with a conventional method. When carrying out ultraviolet curing, it is desirable to use a photopolymerization initiator.

[0019] The various photopolymerization initiators and photopolymerization initiation assistant which are used for common ultraviolet curing mold resin as a photopolymerization initiator used by this invention can be used. For example, a benzoin, benzoin methyl ether, benzoin ethyl ether, Benzoin butyl ether, 2-methyl benzoin, a benzophenone, MIHIRAZU ketone, benzyl, benzyl dimethyl ketal, 2, and 2-diethoxy acetophenone, A 2 and 2-dimethoxy-2-phenyl acetophenone, a benzoin benzoic acid, Methyl o-benzoylbenzoate, 4-benzoyl-4'-methyl diphenyl sulfide, 3 and 3'-dimethyl-4-methoxybenzophenone, 1-(4-dodecyl phenyl)-2-hydroxy-isobutane-1-ON, 1-hydroxy cyclohexyl phenyl ketone, 2-hydroxy - 2-methyl-1-phenyl propane-1-ON, The 2-methyl-1-[4-(methylthio phenyl)]-2-morpholino propane -1, 2-chloro thioxan ton, 2, 4-dimethyl thioxan ton, 2, 4-diisopropyl thioxan ton, Isopropyl thioxan ton, 2 and 4, and 6-trimethyl benzoyl diphenylphosphine oxide etc. can be mentioned. These photopolymerization initiators It cannot matter even if it carries out mixed use at a rate of arbitration, but one sort or at least two sorts or more can also be used together with photopolymerization initiation assistants, such as amines.

[0020] The amount of this invention used of a photopolymerization initiator usually has desirable 0.5 - 20 weight section from a constituent to the part except volatile matter, such as a solvent.

[0021] As photopolymerization initiators, such as amines, for example, 2-dimethylaminoethyl benzoate, a dimethylamino acetophenone, p-dimethylamino ethyl benzoate, p-dimethylamino isoamyl benzoate, etc. can be mentioned.

[0022] The amount of the photopolymerization initiation assistant used usually has desirable 0.5 - 15 weight section from a constituent to the part except volatile matter, such as a solvent.

[0023] Furthermore, to this invention, an organic solvent, a silane coupling agent, polymerization inhibitor, a leveling agent, light stabilizer, an antioxidant, an antistatic agent, surface lubricant, a bulking agent, etc. can be used together. Hardening by the UV irradiation of the constituent of this invention is performed by specifically irradiating ultraviolet rays using low voltage or a high pressure mercury vapor lamp, a xenon LGT, etc.

[0024] Especially the constituent of this invention is useful as a protection coat agent for optical disks. The protection coat agent for optical disks of this invention is applied so that coating equipments, such as a spin coater, may be used and desiccation spreading film thickness may be preferably set to 1-50

micrometers, and it makes a protective coat form by irradiating ultraviolet rays and hardening them on the record film of an optical disk. In addition, in these approaches, this constituent can also be based on electron beam irradiation instead of ultraviolet rays.

[0025]

[Example] Hereafter, the example of this invention explains still more concretely. In addition, the section in an example is the weight section.

the bisphenol mold epoxy acrylate 20 weight section of marketing given in the example 1. following table 1, and hydronalium pivalate neopentyl glycol diacrylate (the Nippon Kayaku Co., Ltd. make --) The trade name "Kaya Rudd MANDA" 30 weight section and the phenyloxy ethyl acrylate (Nippon Kayaku Co., Ltd. make, trade name "Kaya Rudd R-561") 50 weight section, Photopolymerization initiator benzophenone (Nippon Kayaku Co., Ltd. make, trade name "kaya KYUA BP-100") 7 weight section Further Photopolymerization initiation assistant, The protection coat agent for optical disks was adjusted by blending the dimethylamino isoamyl benzoate (Nippon Kayaku Co., Ltd. make, trade name "kaya KYUA DMBI") 3 weight section.

[0026] The protection coat agent for optical disks which consists of a presentation shown in Table 1 was prepared like the example 1 (Table 1 examples 1, 2, and 3, the examples 1 and 2 of a comparison, and SD- 17 [the product made from trade name:Dainippon Ink Chemistry, and the protection coat agent for optical disks]).

[0027] In addition, the cable address of each presentation shown in front Naka is as follows.

EPA-1 : Bisphenol mold epoxy acrylate, THE[by Nippon Kayaku Co., Ltd.]-330:ethyleneoxide denaturation trimethylolpropane triacrylate, NPGDA by Nippon Kayaku Co., Ltd. : Neopentyl glycol diacrylate, MANDA by Nippon Kayaku Co., Ltd. : Hydronalium pivalate neopentyl glycol diacrylate, TC[by Nippon Kayaku Co., Ltd.]-101:tetrahydrofurfuryl acrylate, Nippon Kayaku Co., Ltd. make R-561 : Phenyloxy ethyl acrylate, FA[by Nippon Kayaku Co., Ltd.]-513A : Tricyclodecane acrylate, BP [by Hitachi Chemical Co., Ltd.]-100: -- a benzophenone and Nippon Kayaku Co., Ltd. make photopolymerization initiator DMBI:p-dimethylamino isoamyl benzoate -- Nippon Kayaku Co., Ltd. make A photopolymerization initiation assistant Irg-651:2 and 2-dimethoxy-2-phenyl acetophenone, Ciba-Geigy make Photopolymerization initiator [0028]

[Table 1]

table 1	Example 1	Example 2	Example 3	Example 1 of a comparison	Example 2 of a comparison	SD-17
EPA-1	20	30	20	20	30	THE-330
	20	30	20	30	20	MANDA
	30	40	30	40	30	TC-101
	10	10	10	10	10	R-561
	50	30	30	30	30	FA-513A
	35	20	20	20	20	BP-100
	7	53	33	33	33	DMBI(s)
	33	1	1	1	1	Irg-651
	33	3	3	3	3	hardening
contraction (%)	8	8	9	8	10	tensile-fracture elongation (%)
45	20	27	10	7	7	Immediately after 5 curvature
appearance hardening	O	After	O	O	O	**** x25 degree C, 50%, and 1hr endurance test
O	**	O	x	x	xx	85 degree C, 90%, 3days crack Generating

[0029] Hardening contraction was calculated by having measured the liquid density of a class product and the hardened material solid-state specific gravity of a constituent which were obtained, and the result was shown in Table 1.

[0030] It is JIS about the obtained class product. K According to 7127 conventions, the No. 4 form test piece of 200 micrometers of thickness was created, and the result of having performed the hauling trial in 25 degrees C was shown in Table 1.

[0031] Applied the obtained class product so that it might become 50-micrometer thickness to the polycarbonate plate of 0.5mm thickness, and it was made to harden with the hardening equipment which has a high pressure mercury vapor lamp (80 w/cm), and extent of the curvature immediately after hardening (25 degrees C, 50%RH, and 1 hour after) and after durability test (85 degrees C, 90%RH, and three days after) was observed. Extent of curvature was expressed as follows.

O [.... [0032] which has curved greatly] ** in which curvature is not accepted at all x in which curvature is accepted for a while xx in which remarkable curvature is accepted

[Effect of the Invention] There is little curvature under a high-humidity/temperature environment, and the hardened material of the constituent of this invention is excellent in the mechanical property, and very useful as a protection coat agent for high density optical disks especially.

[Translation done.]